

TRANSFER FILM AND MANUFACTURE OF DIFFUSE REFLECTOR PLATE

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EC Classification:
Equivalents:

Abstract

PROBLEM TO BE SOLVED: To provide a transfer film used for manufacturing a diffuse reflector plate for a reflective LCD or the like having fine reflective characteristics.

SOLUTION: Sandblasted polyethylene terephthalate is used as a base film 4 which is coated with a solution for forming a thin film layer, dried to form a thin film layer 2 and covered by a polyethylene film as a cover film 5 to obtain a transfer film. By stripping off the cover film of the transfer film, lamination is carried out so as to bring the thin film layer into contact with a glass substrate and a substrate laminated with a glass substrate, the thin film layer and polyethylene terephthalate film (PET film) is obtained. After irradiating with a ray with which the thin film layer reacts thereon by an exposing device and stripping off PET film from the substrate, projecting and recessing parts due to sandblast processing are transferred on the thin film layer. The projecting and recessing shape shows fine light diffusing properties.

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の成面に余蘊なことは要なる所なり。多量の穀類は民間に貯蔵されたいものを用ゐることである。而して民間に用向けられたい、民間を流通するものと、政府ととの間に差を起さんを用いてもよい、併し当てるに於ては、注意を要する。

半径を a とすると、荷重分布の変化は次の形状として、円筒と凸面荷重の和で表わし、 $0.1\mu m \sim 16\mu m$ 、さらにには、 $0.1\mu m \sim 6\mu m$ 、凸面のどちらが $0.7\mu m$ 以上、 $15.0\mu m$ あるいは両者は同様にどちらのいずれかのみきり方を行い、さらには $15\mu m$ 以上、 $15.0\mu m$ あるいは両者はどちらのいずれかのみきり方であることが好ましい。

[illegible]

「 P 」の距離が「 $P-7 \times 11$ 」の距離で示される所から見て、 P は、反時計回りに傾ける傾角が得られる。また、 $\theta = 15^\circ \sim 16^\circ$ の範囲は、 $P = 30 \times 10$ の距離で示される所から見て、傾角が傾き特性に要する傾角に反時計回りが得られる。このことは、正確に同じ傾角を60度の傾きの距離で示すように、 P 、さらに16度の傾角で70度傾きの距離で示す場合、「 $P-7 \times 11$ 」の距離で「 $P-30 \times 11$ 」の距離で示される場合、この傾きの距離を算出した傾角に互の傾角にすべて傾角が含まれることは限定しない、なぜなら傾点傾角が傾角である。また、傾点傾角が傾角であることは当然である。また、傾点傾角が傾角であることは当然である。

[illegible]

示すように凹部と凸部の高さ1と、凸部のピッチPの図解がP=3.5×11の図解式で示される状態付近である。

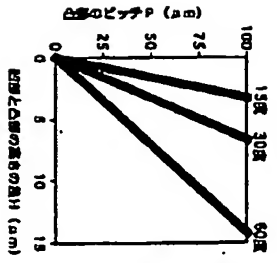
【0020】アルカリで処理可能な樹脂としては、例えば20〜300、重量平均分子量が、500〜2000、0.001の範囲に入っているものが好ましく、例えば低分子量系樹脂とヘビー樹脂との共重合体またはオリフィン系樹脂とヘビー樹脂との共重合体（以下、SMA系樹脂という）、アクリル酸共重合体（以下、SMA系樹脂という）、アクリル酸共重合体（以下、SMA系樹脂という）、アクリル酸共重合体（以下、SMA系樹脂という）等が好ましい。

スチレン系重合体、メチルメタクリレート、 α -メチルメタクリレート、ヒドロキシエチルメタクリレート等のメチルメタクリレート、同様のアルキル系を有するアールメタクリレート等の単量体との共重合体が好ましい。

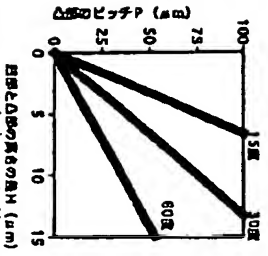
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【図8】



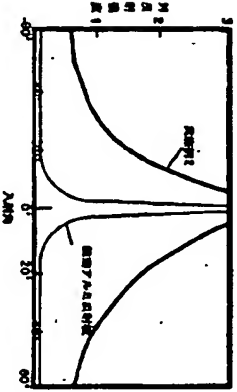
【図10】



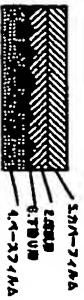
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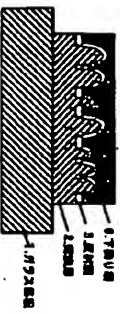
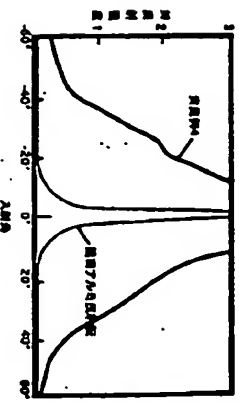
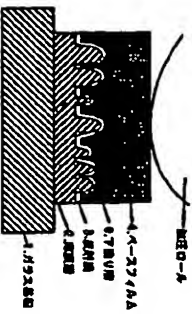
【図11】



【図13】

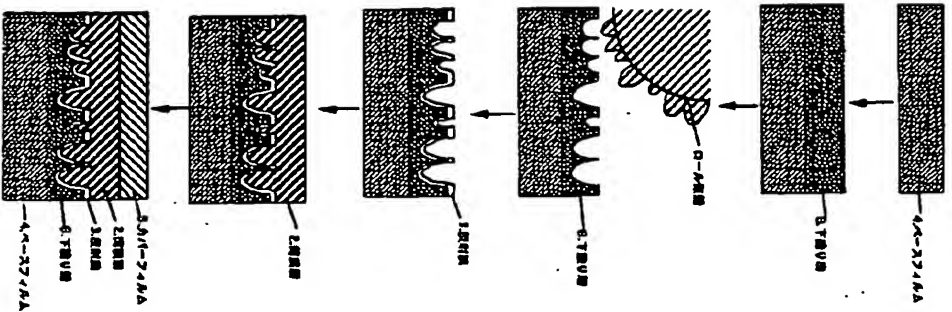


【図16】



(10)

【図14】



【受理】平成10年10月29日(1998.10.

【参考文献】

「修正の余地なし」両所の簡単な説明

【加工内容】

【図1】 本発明の転写アルブムの一例を示す断面図。

【図2】 本発明の転写フィルムの一例を示す断面図。

【図3】 本発明の転写フィルムを使用して製造された

此種反動板の一例を示す所而図。

(図4) 木炭の転写アルミ

は散乱材板の一例を示す断面図、

【例8】反相M.L.C.Dの新開法.

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〔図 7〕 本発明の転写アルムを使用して製造された

此書及び紙の一冊を尔す所願也。

图8) 图7所示的散射线在

虎と狼の群の跡さの知と虎狼の世

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(図9) 本発明の転写フィルムを使用して製造された

は、他方、紙の一面を灰す所而也。

【図10】 図9に示すのは反折板の正面と光線がなす

角度と凹凸部の高さの差と凸部のヒッチとの距離を求す

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（四） 実験の目的は、反動の入り方

APPENDIX.

UNIT 1: Home

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Partial Translation of JP-A 2000-47199

Part A (Page 7)

[0033] Embodiment 3

A polyethylene terephthalate film of a thickness of 100 μm was used as a base film, and a solution of a photo-curing resin which is identical with Embodiment 2 was applied and dried by a comma coater onto the base film so as to have a film thickness of 20 μm . Next, a roll-like original plate having an irregular pattern was pressed against the resin, the photo-curing resin was irradiated with ultraviolet rays irradiated to be cured, and the roll original plate was separated to form an irregular concave and convex shape in the surface of the photo-curing resin layer (undercoat layer). Then, a solution for forming a thin film layer which is identical with Embodiment 1 was applied and dried by a comma coater onto the photo-curing resin layer (undercoat layer) so as to have a film thickness of 2 μm . The product was covered by a polyethylene film as a cover film to obtain a transfer film. While stripping the cover film of the transfer film, lamination was conducted so that the thin film layer was in contact with a glass substrate, by using a laminator (Roll laminator HLM 1500 produced by Hitachi Chemical Technoplant) at a substrate temperature of 90°C, a roll temperature of 80°C, a roll pressure of 7 kg/cm², and a speed of 0.5 m/min., thereby obtaining a substrate in which the thin

film layer, the photo-curing resin layer (undercoat layer), and the base film were stacked on the glass substrate. Thereafter, the photo-curing resin layer (undercoat layer) and the base film were stripped to obtain the thin film layer having the surface of an irregular concave and convex shape. Next, thermocuring was conducted in an oven at 230°C for 30 min., and an aluminum thin film was stacked by the vacuum deposition method in a film thickness of 0.2 μm to form a reflection layer. Fig. 12 shows the incident angle dependency of the reflection intensity (a relative intensity with respect to a standard white tile) in the case where the azimuth angle (ϕ) is constant. It has been proved that a diffusive reflective plate in which a sufficient reflection intensity is obtained in a range of the incident angle of -60° to 60° and which has good reflection characteristics can be obtained.

[0034] Embodiment 4

As shown in Fig. 14, a polyethylene terephthalate film of a thickness of 50 μm was used as the base film 4, and a solution of a photo-curing resin was applied and dried by a comma coater onto the base film 4 so as to have a film thickness of 3 μm . Next, a roll-like original plate having an irregular pattern was pressed against the resin, the photo-curing resin was irradiated with ultraviolet rays irradiated to be cured, and the roll original plate was separated to form an irregular concave and convex shape in the surface of the photo-curing resin layer

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(undercoat layer) 6. Then, an aluminum thin film was stacked on the surface of the photo-curing resin layer (undercoat layer) 6 having the irregular concave and convex shape, by the sputtering method in a film thickness of $0.1\text{ }\mu\text{m}$ to form the reflection film 3, and a solution for forming a thin film layer was applied and dried by a comma coater onto the reflection film 3 of the aluminum thin film so as to have a film thickness of $2\text{ }\mu\text{m}$, thereby forming the thin film layer 2. The thin film layer 2 was covered by a polyethylene film as the cover film 5 to obtain a transfer film such as shown in Fig. 14. Then, as shown in Fig. 15, while stripping the cover film of the transfer film, lamination was conducted so that the thin film layer was in contact with a glass substrate, by using a laminator (Roll laminator HLM1500 produced by Hitachi Chemical Technoplant) at a substrate temperature of 90°C , a roll temperature of 80°C , a roll pressure of 7 kg/cm^2 , and a speed of 0.5 m/min. , thereby obtaining a glass substrate in which the surface layer 2, the reflection film 3 of an aluminum thin film, and the photo-curing resin layer (undercoat layer) 6 were stacked. Next, a heat treatment was conducted in an oven at 230°C for 30 min. A diffusive reflective plate which was obtained as a result of the treatment has good reflection characteristics, and can be used as a diffusive reflective plate for a reflection type LCD.

*** NOTICES ***

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention relates the imprint film used for manufacture of the diffuse reflection plate of the solar battery for which the reflective mold liquid crystal display which does not need a back light, and a well head are needed etc., and its imprint film to the manufacturing method of an activity **** diffuse reflection plate.

[0002]

[Description of the Prior Art] The liquid crystal tee spray (it omits Following LCD) is used for displays, such as current, a clock, a calculator, TV, and a personal computer, taking advantage of the features, such as a thin shape, small, and a low power. Furthermore, it is expected that a color LCD is developed, it is beginning to be used for many applications, such as a navigation system, a view finder, and an object for the monitors of a personal computer, centering on OA and an AV equipment, and the commercial scene will be expanded rapidly from now on in recent years. Since especially the reflective mold LCD that displays from the outside by reflecting the light which carried out incidence has the unnecessary back light, there is little power consumption and it attracts attention as a portable remote terminal device application at the thin shape and the point in which lightweight-izing is possible.

[0003] Although the super-twisted-nematic method is adopted as the Twisted Nematic method list by the reflective mold LCD from the former, by these methods, one half of incident light will not be used for a display by the linearly polarized light child, and a display will become dark. Then, a polarizer is reduced to one sheet and the display mode of the method combined with the phase contrast plate or a phase transition mold guest host method is proposed.

[0004] In order to obtain a bright display in the reflective mold LCD, using outdoor daylight efficiently, it is necessary to make the luminous intensity scattered about in the direction vertical to the display screen increase to the incident light from all include angles further. Therefore, it is required to control the reflective film on a reflecting plate so that a suitable reflection property is obtained. The approach (JP,4-243226,A) of applying a photopolymer to a substrate, patternizing using a photo mask, forming irregularity, forming a metal thin film, and forming a diffuse reflection plate is proposed.

[0005]

[Problem(s) to be Solved by the Invention] By the aforementioned approach, since there was a process which exposes with a photo mask for every substrate, and is developed in order to form irregularity, a process is complicated and it was not able to be said to be low cost and high productivity. Moreover, it is difficult to produce to stability the diffuse reflection plate which has a fixed reflection property that a concavo-convex configuration tends to change with processes, such as development and postbake, in a photo mask. By the aforementioned approach, since spreading of the photopolymer of multiple times, exposure, and development are required, a process becomes more complicated to obtain a diffuse reflection plate with two or more concavo-convex height in order to raise a reflection property furthermore. This invention offers the imprint film used for manufacture of the diffuse reflection plate for reflective mold LCD which has a good reflection property.

[0006]

[Means for Solving the Problem] The field where the laminating of the thin film layer is carried out, and a laminating is not carried out to said temporary base material of said thin film layer constitutes the adhesion side to a transferred substrate in the temporary base material with which the shaped surface where the imprint film of this invention grants a predetermined function was formed. As the shaped surface which grants a predetermined function is a concavo-convex field which can carry out diffuse reflection of the light, it can consider as the imprint film for manufacture of a diffuse reflection plate. In this case, it can consider as the configuration to which the laminating of the reflective film was carried out between the concavo-convex side which can carry out diffuse reflection of the light, and the thin film layer. What consists of an under coat in which the shaped surface which grants the base film or base film with which the shaped surface which grants a predetermined function was formed as a temporary base material, and a predetermined function was formed is used.

[0007] The imprint film with which it was made for the shaped surface which grants a predetermined function to turn into a concavo-convex field which can carry out diffuse reflection of the light is used, lamination and a temporary base material can be exfoliated on the surface of a substrate in the adhesion side to the transferred substrate of the thin film layer of an imprint film, a thin film layer can be imprinted to a substrate, and a diffuse reflection plate can be manufactured by forming the reflective film in a thin film layer further. Moreover, it is made for the shaped surface which grants a predetermined function to turn into a concavo-convex field which can carry out diffuse reflection of the light. The imprint film which carried out the laminating of the reflective film can be used between the concavo-convex field which can carry out diffuse reflection of the light, and a thin film layer, and a diffuse reflection plate can be manufactured by exfoliating lamination and a temporary base material on the surface of a substrate in the adhesion side to the transferred substrate of the thin film layer of an imprint film, and imprinting a thin film layer and the reflective film to a substrate.

[0008]

[Embodiment of the Invention] Drawing 1, the sectional view in which 2 shows an example of the imprint film of this invention, drawing 3, the sectional view showing an example of the diffuse reflection plate with which 4 was manufactured using the imprint film of this invention, Drawing 5 is the sectional view of the reflective mold LCD. A glass substrate and 2 one in drawing A thin film layer, 3 -- the reflective film and 4 -- a base film and 5 -- a covering film and 11 -- a light filter and 12 -- a black matrix and 13 -- a transparent electrode and 14 -- in the flattening film and 15, a spacer and 18 show a phase contrast film and, as for the orientation film and 16, 19 shows a polarizing plate, as for a liquid crystal layer and 17.

[0009] It laminates so that a thin film layer may touch a substrate, and the laminating of a thin film layer and the base film is carried out on a substrate, removing a covering film using the imprint film with which the laminating of the base film by which processing processing was carried out, a thin film layer, and the covering film was carried out one by one in the condition that a front face has much detailed irregularity, and the thin film layer which has much detailed irregularity on a front face can be formed on a substrate by exfoliating said base film. If reflective film, such as a metal thin film, is further formed in this, a desired diffuse reflection plate will be obtained. Moreover, if it laminates so that a thin film layer may touch a substrate, and the laminating of a thin film layer, the reflective film, and the base film is carried out on a substrate and only said base film is exfoliated, removing a covering film using the imprint film which carried out the laminating of the reflective film between a thin film layer and a base film beforehand, a desired diffuse reflection plate will be obtained.

[0010] It can consist of an under coat which has much detailed irregularity as a temporary base material of an imprint film on the base film or base film which has much detailed irregularity on a front face, and a front face. What was manufactured by pressing the pattern by which processing processing was carried out against the condition of having much detailed irregularity on a front face can also be used for a base film. Moreover, a deformable under coat is prepared in a base film, and what was formed according to the process which presses the pattern by which processing processing was carried out against the condition of having much detailed irregularity at this layer, and the process which hardens an under coat

can be used. Moreover, that by which sandblasting processing of the front face of a base film was carried out can also be used.

[0011] An example of the production approach of the temporary base material which changed processing processing into the condition of having much detailed irregularity of this invention is shown in reference "*** and an intelligible optical disk (an optronics company, Heisei 2 issuance)." That is, after exposing and developing negatives using the photo mask which has a predetermined mask pattern after applying a photoresist on a glass plate or carrying out laser cutting, silver or the nickel film can be formed in a pattern formation side by the vacuum deposition method, the sputtering method, etc. (electric conduction-ized processing), the laminating of the nickel can be carried out by electrocasting, and a father pattern can be produced according to the process which exfoliates from a glass plate. Exfoliation processing is carried out to this FAZA pattern, nickel electrocasting is performed again, it can exfoliate from a FAZA pattern, a mother pattern can be produced, and much detailed irregularity can be formed using this mother pattern.

[0012] That by which much detailed irregularity was formed in the front face of base materials, such as a part of the shape of a sheet, plate or shape of a roll, and curved surface, at the whole surface or a required part can be used for the temporary base material which has much detailed irregularity, and it may stick on a pressurizer, or it may be put and used for it between the fields and pressurizers which form irregularity. Heat, light, etc. may be given at the process to press.

[0013] It is necessary to design extent of the irregularity of the temporary base material which has much detailed irregularity in consideration of usually deforming by hardening a thin film layer. if the reduction of area by hardening of a thin film layer is set to a -- as the configuration after hardening of a thin film layer -- the difference of the height of a crevice and heights -- 0.1 micrometers - 15 micrometers -- further -- the pitch of 0.1 micrometers - 5 micrometers and heights -- either of 0.7-micrometer or more 150 micrometers or pixel pitches -- it is desirable that it is [of 2 more micrometer or more 150 micrometers or a pixel pitch] below the smaller one either below the smaller one.

[0014] The measuring device of the reflection property of the diffuse reflection plate of this invention is shown in drawing 6. If the include angle which a reflected ray 21 and an incident ray 22 make is set to theta, and it enlarges in the range of theta needed, the brightness, i.e., the reflectivity, observed in the direction of a normal of a diffuse reflection plate, the diffuse reflection plate which is excellent in a reflection property will be obtained. When the range of theta needed is -60 degrees - 60 degrees, if the diffuse reflection plate with which irregularity is formed in respect of the concave bend as shown in drawing 7 is near the straight line where the relation of the pitch P of heights is indicated to be height H of a crevice and heights with the relational expression of $P=7 \times H$ as shown in drawing 8 $R > 8$, the diffuse reflection plate which is excellent in a reflection property will be obtained. Moreover, when theta is -15 degrees - 15 degrees, if it is near the straight line shown with the relational expression of $P=30 \times H$, the diffuse reflection plate which is excellent in a reflection property will be obtained. This shows that what is necessary is to just be made to the configuration which compounded the field near [which are shown with the relational expression of $P=7 \times H$, and the relational expression of $P=30 \times H / \text{two}$] a straight line, when it is going to acquire diffuse reflection by the light source of the range of 60 degrees and is going to acquire it more strongly in 15 more degrees to a normal. Of course, it limits that no irregularity is contained to the range near [above-mentioned / two] a straight line. It is because it is natural that the configuration of concavo-convex configuration production process top plurality is formed. Moreover, the effect of interference of the gap homogeneity of a liquid crystal layer or light must be taken into consideration.

[0015] therefore, extent of the irregularity of a temporary base material -- a convex surface -- the difference of the height of a crevice and heights -- 0.1xamum-15xamum -- further -- the pitch of 0.1xamum - 5xamum and heights -- either of 0.7-micrometer or more 150 micrometers or pixel pitches - - it is desirable that it is [of 2 more micrometer or more 150 micrometers or a pixel pitch] below the smaller one either below the smaller one. The value of a may change with construction material of a thin film layer, for example, it may be 2 or it may be 1 or 0.7. Although the above is an example at the time of forming the irregularity of a diffuse reflection plate in respect of a concave bend as shown in drawing

7, when the irregularity of a diffuse reflection plate is formed on a curved surface compound [concavo-convex] as shown in drawing 9, if the diffuse reflection from the light source of less than 60 degrees is near the straight line where the relation of the pitch P of heights is indicated to be height H of a crevice as shown in drawing 10, and heights with the relational expression of $P=3.5 \times H$, it is excellent in a reflection property to a normal. The concavo-convex configuration does not need to be periodically located in a line in the field, and may be irregular. Moreover, since moire will occur if different periodicity from a pixel pitch is in a concavo-convex configuration in the case of the reflective mold LCD, concavo-convex periodicity is the same as a pixel pitch, or it is desirable that irregularity is located in a line in the period which breaks integrally, or the irregular array.

[0016] Moreover, although especially a concavo-convex field configuration is not limited, it is desirable not only a compound flat surface but that they are a concave bend side or a convex surface, a curved surface compound [concavo-convex], the concave bend side further approximated to the spherical surface or a paraboloid or a convex surface, and a curved surface compound [concavo-convex]. It is because the diffuse reflection light from a wide range light source location is expectable by considering as a curved surface.

[0017] It is thermally [as a base film of this invention / chemically and] stable, and what can be fabricated to a sheet or tabular can be used. Specifically, they are metals, such as cellulose, such as Pori halogenation vinyl, such as polyolefines, such as polyethylene and polypropylene, a polyvinyl chloride, and a polyvinylidene chloride, cellulose acetate, a nitrocellulose, and cellophane, a polyamide, polystyrene, a polycarbonate, polyimide, polyester or aluminum, and copper. Especially a desirable thing is biaxial drawing polyethylene terephthalate excellent in dimensional stability in these.

[0018] Although the constituent containing an organic polymer deformable as a thin film layer or an inorganic compound, and a metal can be used, the organic polymer constituent which it applies on a base material preferably and can be rolled round in the shape of a film is used. moreover, independent [if needed / in a color, an organic pigment, an inorganic pigment, fine particles, and its composite] in this -- or you may mix and use. A photopolymer constituent and a thermosetting resin constituent can also be used for a thin film layer. The dielectric constant of these thin film layer, a degree of hardness, a refractive index, and especially spectral transmittance are not limited.

[0019] In such a thing, the adhesion over a transferred substrate is good and it is desirable to use what has the good detachability from a base film. For example, cellulose, such as Pori halogenation vinyl, such as polyolefines, such as acrylic resin, polyethylene, and polypropylene, a polyvinyl chloride, and a polyvinylidene chloride, cellulose acetate, a nitrocellulose, and cellophane, a polyamide, polystyrene, a polycarbonate, polyimide, polyester, etc. can be used. Moreover, what has photosensitivity can be used. Depending on the case, it can leave only the part which needs the irregularity of a substrate, and the photopolymer in which development is possible can also be used with alkali etc. so that an unnecessary part may be removed. In order to raise thermal resistance, solvent resistance, and configuration stability, the resin constituent which can be hardened by heat or light can also be used after concavo-convex formation. Furthermore, adhesion with a substrate can also be raised by adding a coupling agent and an adhesive grant agent. Applying an adhesive grant agent to the adhesion side of a substrate or a thin film layer in order to raise adhesion is also included.

[0020] That to which, as for close, the acid number of weight average molecular weight [20-300, and] is in the range of 1,500-200,000 with alkali as resin in which development is possible is desirable. For example, the copolymer or its derivative of a styrene monomer and a maleic acid The partial saturation monomer and styrene monomer which have carboxyl groups, such as (it is hereafter called SM system polymer), an acrylic acid, or a methacrylic acid, A copolymer with monomers, such as alkyl methacrylate, such as methyl methacrylate, t-butyl methacrylate, and hydroxyethyl methacrylate, and alkyl acrylate which has the same alkyl group, is desirable.

[0021] SM system copolymer Styrene, alpha methyl styrene, m, or p-methoxy styrene, Styrene, or its derivative (styrene monomer) and maleic anhydrides, such as p-methyl styrene, p-hydroxystyrene, and 3-hydroxymethyl-4 hydroxy-styrene, A maleic acid, maleic-acid monomethyl, maleic-acid monoethyl, maleic-acid Monod n-propyl, There are some (henceforth a copolymer (I)) to which copolymerization of

the maleic-acid derivatives, such as maleic-acid Monod iso-propyl, maleic-acid-n-butyl, maleic-acid Monod iso-butyl, and maleic-acid Monod tert-butyl, was carried out. There are some which denaturalized in a copolymer (I) with the compound which has a reactant double bond about the above mentioned copolymers (I), such as alkyl methacrylate, such as methyl methacrylate and t-butyl methacrylate, (copolymer (II)).

[0022] The above-mentioned copolymer (II) to the acid-anhydride radical or carboxyl group in a copolymer (I) Unsaturated alcohol, For example, allyl alcohol, 2-Blanc-1-2-all furfuryl alcohol, Oleyl alcohol, cinnamyl alcohol, 2-hydroxyethyl acrylate, Unsaturated alcohol, such as hydroxyethyl methacrylate and N-methylol AKURI amide, Glycidyl acrylate, glycidyl methacrylate, allyl glycidyl ether, It can manufacture by making it react with the epoxy compound which has one an oxirane ring and reactant double bonds, such as alpha-ethyl glycidyl acrylate and itaconic-acid monoalkyl monoglycidyl ester, respectively. In this case, it is required for the carboxyl group required in order to perform alkali development to remain into a copolymer. Grant of a reactant double bond is desirable from the point of photosensitivity like [the polymer which has carboxyl groups other than SM system polymer] the above. Composition of these copolymers can be performed according to the approach indicated by JP,47-25470,B, JP,48-85679,B, JP,51-21572,B, etc. If the thickness of a thin film layer is formed more thickly than the difference of elevation of the irregularity of a temporary base material which has irregularity, it will tend to reproduce a concavo-convex configuration. thickness is equal -- it is -- it is -- if thin, a concavo-convex configuration will deform. Moreover, the problem later mentioned when forming irregularity may occur.

[0023] As an under coat of this invention, the thing harder than a thin film layer of after concavo-convex formation is desirable. For example, polyolefines, such as polyethylene and polypropylene, ethylene and vinyl acetate, Ethylene, acrylic ester and ethylene, and an ethylene copolymer like vinyl alcohol, The copolymer of a polyvinyl chloride, a vinyl chloride, and vinyl acetate, the copolymer of a vinyl chloride and vinyl alcohol, A styrene copolymer like a polyvinylidene chloride, polystyrene, styrene, and acrylic ester (meta), A vinyltoluene copolymer like polyvinyl toluene, vinyltoluene, and acrylic ester (meta), At least one or more kinds of organic macromolecules chosen from the copolymer of Pori (meta) acrylic ester and acrylic ester like butyl acrylate (meta) and vinyl acetate (meta), synthetic rubber, a cellulose derivative, etc. can be used. In order to carry out concavo-convex formation postcure, the monomer which has a photoinitiator and an ethylene nature double bond if needed can be added beforehand. Moreover, although the sensitization type was shown by using negative-mold material, it is satisfactory even if it is a positive type.

[0024] As the method of application of the thin film layer of this invention, or an under coat, there are roll coater spreading, spin coater spreading, spray spreading, HOERA spreading, dip coater spreading, curtain flow coater spreading, wire bar coater spreading, gravure coater spreading, air knife coater spreading, etc. A thin film layer or an under coat constituent is applied to the temporary base material up etc. by the above-mentioned approach.

[0025] With a reflective mold LCD display, a metal with a high reflection factor, for example, aluminum metallurgy, silver, etc. are formed by the vacuum deposition method or the sputtering method in 300nm to 800nm which is a light wavelength field that what is necessary is just to choose an ingredient appropriately by the wavelength field to reflect as reflective film. Moreover, the laminating of the reflective increment film (it indicates to the optical introduction 2 (Junpei in a crossing, Asakura Publishing, 1976 issuance)) may be carried out by the above-mentioned approach. The thickness of the reflective film has 0.01 micrometers - desirable 50 micrometers. Moreover, the reflective film may carry out pattern formation only of the required part with the photolithography method, mask vacuum deposition, etc.

[0026] It is thermally [as a covering film of the imprint film of this invention / chemically and] stable, and what has easy exfoliation with a thin film layer is desirable. It is specifically the thing of the shape of a thin sheet, such as polyethylene, polypropylene, polyethylene terephthalate, and polyvinyl alcohol, and what has surface high smooth nature is desirable. In order to give detachability, what carried out mold release processing to the front face is contained.

[0027] Moreover, the surface of separation after the imprint to the substrate of each imprint film becomes between the reflective film, a base film or the reflective film, and under coats, when there is reflective film between a thin film layer and a base film. However, by the case where it is the film structure which has an under coat and the reflective film depending on the object, since the laminating of the under coat is carried out to a substrate, between an under coat and base films can be set as the surface of separation. When giving the function as an electric insulation layer in the case of using the reflective film as an electrode to an under coat as an object which carries out the laminating of the under coat to a substrate, Or when using a photopolymer for an under coat when giving a role of a flattening layer of reflective film irregularity to an under coat, and giving a role of etching resist of the reflective film, an under coat may be colored further and a role of a partial protection-from-light layer of the reflective film may be given.

[0028] As an approach of imprinting the thin film layer on a temporary base material, and the reflective film to a substrate, a covering film may be removed and heating sticking by pressure may be carried out on a substrate. When you furthermore need adhesion, a required drug solution etc. may wash a substrate, or an adhesion grant agent may be applied to a substrate, or the approach of irradiating ultraviolet rays etc. may be used for a substrate. It is desirable to use the roll laminator which sends out a substrate, pinching a substrate between the rubber covered rolls and base films which can be heated and pressurized as equipment which laminates the imprint film of this invention, rotating a roll, and pressing an imprint film against a substrate. Thus, the thickness of the thin film layer formed in the substrate front face has the desirable range of 0.1 micrometers - 50 micrometers. At this time, the one where the thickness of a thin film layer is thicker than the maximum difference of elevation of a concavo-convex configuration tends to reproduce a concavo-convex configuration. thickness is equal -- it is -- it is -- if thin, a thin film layer will be broken through by pattern heights, the flat-surface section occurs, and it is hard coming to obtain diffuse reflection efficiently

[0029] When a negative-mold photopolymer is used for this thin film layer, in order to give the stability of that configuration, it exposes with an exposure machine, and a sensitization part is stiffened. As an exposure machine which can be applied to this invention, a carbon arc lamp, an ultrahigh pressure mercury lamp, a high-pressure mercury-vapor lamp, a xenon lamp, a metal halide lamp, a fluorescent lamp, a tungsten lamp, etc. are mentioned. What is necessary is just to give the quantity of light more than the light exposure which for that a photopolymer hardens in this invention that what is necessary is just to be able to do by stiffening the irregularity formed beforehand, although the parallel exposure machine for pattern formation, such as a pixel and BM, is sufficient as this aligner. Therefore, the UV irradiation equipment using the scattered light incorporable into the line generally used as a substrate washing station can be used. By using these equipments, the tolerance to light exposure is large compared with the case where can produce cheaply compared with the technique using a photo mask, and a photo mask is used. Moreover, although the sensitization type was shown by using negative-mold material, it is satisfactory even if it is a positive type. Exposure is performed, before removing a base material, or after removing. A cushion layer may be prepared in a base film in order to raise the adhesion to a substrate, and flattery nature.

[0030] Although the reflective mold LCD display explained above, the diffuse reflection plate manufactured with the imprint film of this invention can be used for a device with required carrying out diffuse reflection of the external beam of light. For example, there is a diffuse reflection plate aiming at the improvement in effectiveness of a solar battery. Moreover, the imprint film of this invention is applicable to manufacture of the white plate of a gobo, an ornament plate, an obscured glass, and a projection screen, a light filter, a condensing plate, a dimming plate, etc. Thus, the imprint film of this invention can be imprinted also to a glass plate, a synthetic-resin plate, a synthetic-resin film, a metal plate, and ***** or the becoming thing, and not only a flat surface but a curved surface and a solid side are sufficient as a transferred substrate side.

[0031]

[Example] Example 1 drawing 1 explains. The polyethylene terephthalate with a thickness of 50 micrometers which carried out sandblasting processing was used for the base film 4, spreading

desiccation of the following solution for thin film stratification was carried out, the thin film layer 2 was formed so that it might become 6-micrometer thickness by comma coater on this film, and the imprint film as covered a polyethylene film as a covering film 5 and shown in drawing 1 was obtained.

The solution for thin-film stratification: Styrene, methyl methacrylate, ethyl acrylate, an acrylic acid, and glycidyl methacrylate copolymerization resin were used as a polymer (polymer A). The about 35000 acid number of molecular weight is 110. The section is the weight section (it is below the same).

(Polymer) Polymer A The 70 sections (monomer) Pentaerythritol tetraacrylate The 30 sections (photoinitiator) IRUGAKYUA 369 (Tiba Special TI Chemicals) The 2.2 sections N and N-tetraethyl -4, a 4'-diamino benzophenone The 2.2 sections (solvent) Propylene glycol monomethyl ether A 492 section (polymerization inhibitor) p-methoxy phenol The 0.1 sections (surfactant) Perfluoroalkyl alkoxylate The 0.01 sections Next, removing the covering film of this imprint film A laminator (the roll laminator HLM 1500, Hitachi Chemical techno plant company make) is used so that a thin film layer may touch a glass substrate. It laminated by part for 0.5m/in the substrate temperature of 100 degrees C, the roll temperature of 100 degrees C, the roll pressure cm of 6kg/square, and rate, and the glass substrate, the thin film layer, and the substrate with which the laminating of the polyethylene terephthalate film (PET film) was carried out were obtained. After carrying out the 500 mJ(s)/square cm exposure of the beam of light to which a thin film layer reacts with an exposure machine (a large-sized manual exposure machine, MAP1200, great Japan screen company make), when the PET film was removed from this substrate, the irregularity by which sandblasting processing was carried out was imprinted on the thin film layer, and it was the concavo-convex configuration excellent in the diffusibility of light. In order to obtain thermal resistance, for 240 degrees C and 20 minutes, oven (made in formation [402 Clean oven CSO- Kusumoto]) performed heat curing, and the laminating of the reflective film was carried out so that it might become the thickness of 0.1 micrometers by the sputtering method about aluminum thin film at this. In this way, a dependency is shown in drawing 1111 whenever [incident angle / of the reflectivity (relative intensity to a standard white plate) of the produced diffuse reflection plate] (when an azimuth (phi) is set constant). Reflectivity sufficient in -60 degrees - 60 degrees was obtained whenever [incident angle], and the diffuse reflection plate excellent in the reflection property was able to be obtained. As shown in drawing 2 $R > 2$, the reflective film 3 is beforehand formed in the concavo-convex field of a base film 4, the thin film layer 2 can be formed on the reflective film 3, a polyethylene film can be covered as a covering film 5, and an imprint film can also be obtained. In this case, a diffuse reflection plate can be obtained by exfoliating a base film 4. [0032] As shown in example 2 drawing 13, spreading desiccation was carried out and it considered as the under coat 6 so that a polyethylene terephthalate film with a thickness of 50 micrometers might be used for a base film 4, the photopolymer constituent of the following presentation might be dissolved with a solvent (propylene glycol monoethyl ether acetate) on this base film 4 and it might become 1.5-micrometer thickness by the comma coating machine.

Photopolymer solution (% is weight %) : Acrylic-acid-butyl acrylate vinyl acetate copolymerization resin 33% Butyl acrylate (monomer) 53% Vinyl acetate (monomer) 8% Acrylic acid (monomer)

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PRIOR ART

[Description of the Prior Art] The liquid crystal tee spray (it omits Following LCD) is used for displays, such as current, a clock, a calculator, TV, and a personal computer, taking advantage of the features, such as a thin shape, small, and a low power. Furthermore, it is expected that a color LCD is developed, it is beginning to be used for many applications, such as a navigation system, a view finder, and an object for the monitors of a personal computer, centering on OA and an AV equipment, and the commercial scene will be expanded rapidly from now on in recent years. Since especially the reflective mold LCD that displays from the outside by reflecting the light which carried out incidence has the unnecessary back light, there is little power consumption and it attracts attention as a portable remote terminal device application at the thin shape and the point in which lightweight-izing is possible.

[0003] Although the super-twisted-nematic method is adopted as the Twisted Nematic method list by the reflective mold LCD from the former, by these methods, one half of incident light will not be used for a display by the linearly polarized light child, and a display will become dark. Then, a polarizer is reduced to one sheet and the display mode of the method combined with the phase contrast plate or a phase transition mold guest host method is proposed.

[0004] In order to obtain a bright display in the reflective mold LCD, using outdoor daylight efficiently, it is necessary to make the luminous intensity scattered about in the direction vertical to the display screen increase to the incident light from all include angles further. Therefore, it is required to control the reflective film on a reflecting plate so that a suitable reflection property is obtained. The approach (JP,4-243226,A) of applying a photopolymer to a substrate, patternizing using a photo mask, forming irregularity, forming a metal thin film, and forming a diffuse reflection plate is proposed.

[Translation done.]

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MEANS

[Means for Solving the Problem] The field where the laminating of the thin film layer is carried out, and a laminating is not carried out to said temporary base material of said thin film layer constitutes the adhesion side to a transferred substrate in the temporary base material with which the shaped surface where the imprint film of this invention grants a predetermined function was formed. As the shaped surface which grants a predetermined function is a concavo-convex field which can carry out diffuse reflection of the light, it can consider as the imprint film for manufacture of a diffuse reflection plate. In this case, it can consider as the configuration to which the laminating of the reflective film was carried out between the concavo-convex side which can carry out diffuse reflection of the light, and the thin film layer. What consists of an under coat in which the shaped surface which grants the base film or base film with which the shaped surface which grants a predetermined function was formed as a temporary base material, and a predetermined function was formed is used.

[0007] The imprint film with which it was made for the shaped surface which grants a predetermined function to turn into a concavo-convex field which can carry out diffuse reflection of the light is used, lamination and a temporary base material can be exfoliated on the surface of a substrate in the adhesion side to the transferred substrate of the thin film layer of an imprint film, a thin film layer can be imprinted to a substrate, and a diffuse reflection plate can be manufactured by forming the reflective film in a thin film layer further. Moreover, it is made for the shaped surface which grants a predetermined function to turn into a concavo-convex field which can carry out diffuse reflection of the light. The imprint film which carried out the laminating of the reflective film can be used between the concavo-convex field which can carry out diffuse reflection of the light, and a thin film layer, and a diffuse reflection plate can be manufactured by exfoliating lamination and a temporary base material on the surface of a substrate in the adhesion side to the transferred substrate of the thin film layer of an imprint film, and imprinting a thin film layer and the reflective film to a substrate.

[0008]

[Embodiment of the Invention] Drawing 1, the sectional view in which 2 shows an example of the imprint film of this invention, drawing 3, the sectional view showing an example of the diffuse reflection plate with which 4 was manufactured using the imprint film of this invention, Drawing 5 is the sectional view of the reflective mold LCD. A glass substrate and 2 one in drawing A thin film layer, 3 -- the reflective film and 4 -- a base film and 5 -- a covering film and 11 -- a light filter and 12 -- a black matrix and 13 -- a transparent electrode and 14 -- in the flattening film and 15, a spacer and 18 show a phase contrast film and, as for the orientation film and 16, 19 shows a polarizing plate, as for a liquid crystal layer and 17.

[0009] It laminates so that a thin film layer may touch a substrate, and the laminating of a thin film layer and the base film is carried out on a substrate, removing a covering film using the imprint film with which the laminating of the base film by which processing processing was carried out, a thin film layer, and the covering film was carried out one by one in the condition that a front face has much detailed irregularity, and the thin film layer which has much detailed irregularity on a front face can be formed on a substrate by exfoliating said base film. If reflective film, such as a metal thin film, is further formed

in this, a desired diffuse reflection plate will be obtained. Moreover, if it laminates so that a thin film layer may touch a substrate, and the laminating of a thin film layer, the reflective film, and the base film is carried out on a substrate and only said base film is exfoliated, removing a covering film using the imprint film which carried out the laminating of the reflective film between a thin film layer and a base film beforehand, a desired diffuse reflection plate will be obtained.

[0010] It can consist of an under coat which has much detailed irregularity as a temporary base material of an imprint film on the base film or base film which has much detailed irregularity on a front face, and a front face. What was manufactured by pressing the pattern by which processing processing was carried out against the condition of having much detailed irregularity on a front face can also be used for a base film. Moreover, a deformable under coat is prepared in a base film, and what was formed according to the process which presses the pattern by which processing processing was carried out against the condition of having much detailed irregularity at this layer, and the process which hardens an under coat can be used. Moreover, that by which sandblasting processing of the front face of a base film was carried out can also be used.

[0011] An example of the production approach of the temporary base material which changed processing processing into the condition of having much detailed irregularity of this invention is shown in reference "*** and an intelligible optical disk (an optronics company, Heisei 2 issuance)." That is, after exposing and developing negatives using the photo mask which has a predetermined mask pattern after applying a photoresist on a glass plate or carrying out laser cutting, silver or the nickel film can be formed in a pattern formation side by the vacuum deposition method, the sputtering method, etc. (electric conduction-ized processing), the laminating of the nickel can be carried out by electrocasting, and a father pattern can be produced according to the process which exfoliates from a glass plate. Exfoliation processing is carried out to this FAZA pattern, nickel electrocasting is performed again, it can exfoliate from a FAZA pattern, a mother pattern can be produced, and much detailed irregularity can be formed using this mother pattern.

[0012] That by which much detailed irregularity was formed in the front face of base materials, such as a part of the shape of a sheet, plate or shape of a roll, and curved surface, at the whole surface or a required part can be used for the temporary base material which has much detailed irregularity, and it may stick on a pressurizer, or it may be put and used for it between the fields and pressurizers which form irregularity. Heat, light, etc. may be given at the process to press.

[0013] It is necessary to design extent of the irregularity of the temporary base material which has much detailed irregularity in consideration of usually deforming by hardening a thin film layer. if the reduction of area by hardening of a thin film layer is set to a -- as the configuration after hardening of a thin film layer -- the difference of the height of a crevice and heights -- 0.1 micrometers - 15 micrometers -- further -- the pitch of 0.1 micrometers - 5 micrometers and heights -- either of 0.7-micrometer or more 150 micrometers or pixel pitches -- it is desirable that it is [of 2 more micrometer or more 150 micrometers or a pixel pitch] below the smaller one either below the smaller one.

[0014] The measuring device of the reflection property of the diffuse reflection plate of this invention is shown in drawing 6 . If the include angle which a reflected ray 21 and an incident ray 22 make is set to theta, and it enlarges in the range of theta needed, the brightness, i.e., the reflectivity, observed in the direction of a normal of a diffuse reflection plate, the diffuse reflection plate which is excellent in a reflection property will be obtained. When the range of theta needed is -60 degrees - 60 degrees, if the diffuse reflection plate with which irregularity is formed in respect of the concave bend as shown in drawing 7 is near the straight line where the relation of the pitch P of heights is indicated to be height H of a crevice and heights with the relational expression of $P=7 \times H$ as shown in drawing 8 $R > 8$, the diffuse reflection plate which is excellent in a reflection property will be obtained. Moreover, when theta is -15 degrees - 15 degrees, if it is near the straight line shown with the relational expression of $P=30 \times H$, the diffuse reflection plate which is excellent in a reflection property will be obtained. This shows that what is necessary is to just be made to the configuration which compounded the field near [which are shown with the relational expression of $P=7 \times H$, and the relational expression of $P=30 \times H / \text{two}$] a straight line, when it is going to acquire diffuse reflection by the light source of the range of 60 degrees and is going

to acquire it more strongly in 15 more degrees to a normal. Of course, it limits that no irregularity is contained to the range near [above-mentioned / two] a straight line. It is because it is natural that the configuration of concavo-convex configuration production process top plurality is formed. Moreover, the effect of interference of the gap homogeneity of a liquid crystal layer or light must be taken into consideration.

[0015] therefore, extent of the irregularity of a temporary base material -- a convex surface -- the difference of the height of a crevice and heights -- 0.1xamum-15xamum -- further -- the pitch of 0.1xamum - 5xamum and heights -- either of 0.7-micrometer or more 150 micrometers or pixel pitches - - it is desirable that it is [of 2 more micrometer or more 150 micrometers or a pixel pitch] below the smaller one either below the smaller one. The value of a may change with construction material of a thin film layer, for example, it may be 2 or it may be 1 or 0.7. Although the above is an example at the time of forming the irregularity of a diffuse reflection plate in respect of a concave bend as shown in drawing 7, when the irregularity of a diffuse reflection plate is formed on a curved surface compound [concavo-convex] as shown in drawing 9, if the diffuse reflection from the light source of less than 60 degrees is near the straight line where the relation of the pitch P of heights is indicated to be height H of a crevice as shown in drawing 10, and heights with the relational expression of $P=3.5xH$, it is excellent in a reflection property to a normal. The concavo-convex configuration does not need to be periodically located in a line in the field, and may be irregular. Moreover, since moire will occur if different periodicity from a pixel pitch is in a concavo-convex configuration in the case of the reflective mold LCD, concavo-convex periodicity is the same as a pixel pitch, or it is desirable that irregularity is located in a line in the period which breaks integrally, or the irregular array.

[0016] Moreover, although especially a concavo-convex field configuration is not limited, it is desirable not only a compound flat surface but that they are a concave bend side or a convex surface, a curved surface compound [concavo-convex], the concave bend side further approximated to the spherical surface or a paraboloid or a convex surface, and a curved surface compound [concavo-convex]. It is because the diffuse reflection light from a wide range light source location is expectable by considering as a curved surface.

[0017] It is thermally [as a base film of this invention / chemically and] stable, and what can be fabricated to a sheet or tabular can be used. Specifically, they are metals, such as cellulose, such as Pori halogenation vinyl, such as polyolefines, such as polyethylene and polypropylene, a polyvinyl chloride, and a polyvinylidene chloride, cellulose acetate, a nitrocellulose, and cellophane, a polyamide, polystyrene, a polycarbonate, polyimide, polyester or aluminum, and copper. Especially a desirable thing is biaxial drawing polyethylene terephthalate excellent in dimensional stability in these.

[0018] Although the constituent containing an organic polymer deformable as a thin film layer or an inorganic compound, and a metal can be used, the organic polymer constituent which it applies on a base material preferably and can be rolled round in the shape of a film is used. moreover, independent [if needed / in a color, an organic pigment, an inorganic pigment, fine particles, and its composite] in this -- or you may mix and use. A photopolymer constituent and a thermosetting resin constituent can also be used for a thin film layer. The dielectric constant of these thin film layer, a degree of hardness, a refractive index, and especially spectral transmittance are not limited.

[0019] In such a thing, the adhesion over a transferred substrate is good and it is desirable to use what has the good detachability from a base film. For example, cellulose, such as Pori halogenation vinyl, such as polyolefines, such as acrylic resin, polyethylene, and polypropylene, a polyvinyl chloride, and a polyvinylidene chloride, cellulose acetate, a nitrocellulose, and cellophane, a polyamide, polystyrene, a polycarbonate, polyimide, polyester, etc. can be used. Moreover, what has photosensitivity can be used. Depending on the case, it can leave only the part which needs the irregularity of a substrate, and the photopolymer in which development is possible can also be used with alkali etc. so that an unnecessary part may be removed. In order to raise thermal resistance, solvent resistance, and configuration stability, the resin constituent which can be hardened by heat or light can also be used after concavo-convex formation. Furthermore, adhesion with a substrate can also be raised by adding a coupling agent and an adhesive grant agent. Applying an adhesive grant agent to the adhesion side of a substrate or a thin film

layer in order to raise adhesion is also included.

[0020] That to which, as for close, the acid number of weight average molecular weight [20-300, and] is in the range of 1,500-200,000 with alkali as resin in which development is possible is desirable. For example, the copolymer or its derivative of a styrene monomer and a maleic acid The partial saturation monomer and styrene monomer which have carboxyl groups, such as (it is hereafter called SM system polymer), an acrylic acid, or a methacrylic acid, A copolymer with monomers, such as alkyl methacrylate, such as methyl methacrylate, t-butyl methacrylate, and hydroxyethyl methacrylate, and alkyl acrylate which has the same alkyl group, is desirable.

[0021] SM system copolymer Styrene, alpha methyl styrene, m, or p-methoxy styrene, Styrene, or its derivative (styrene monomer) and maleic anhydrides, such as p-methyl styrene, p-hydroxystyrene, and 3-hydroxymethyl-4 hydroxy-styrene, A maleic acid, maleic-acid monomethyl, maleic-acid monoethyl, maleic-acid Monod n-propyl, There are some (henceforth a copolymer (I)) to which copolymerization of the maleic-acid derivatives, such as maleic-acid Monod iso-propyl, maleic-acid-n-butyl, maleic-acid Monod iso-butyl, and maleic-acid Monod tert-butyl, was carried out. There are some which denaturalized in a copolymer (I) with the compound which has a reactant double bond about the above mentioned copolymers (I), such as alkyl methacrylate, such as methyl methacrylate and t-butyl methacrylate, (copolymer (II)).

[0022] The above-mentioned copolymer (II) to the acid-anhydride radical or carboxyl group in a copolymer (I) Unsaturated alcohol, For example, allyl alcohol, 2-Blanc-1-2-all furfuryl alcohol, Oleyl alcohol, cinnamyl alcohol, 2-hydroxyethyl acrylate, Unsaturated alcohol, such as hydroxyethyl methacrylate and N-methylol AKURI amide, Glycidyl acrylate, glycidyl methacrylate, allyl glycidyl ether, It can manufacture by making it react with the epoxy compound which has one an oxirane ring and reactant double bonds, such as alpha-ethyl glycidyl acrylate and itaconic-acid monoalkyl monoglycidyl ester, respectively. In this case, it is required for the carboxyl group required in order to perform alkali development to remain into a copolymer. Grant of a reactant double bond is desirable from the point of photosensitivity like [the polymer which has carboxyl groups other than SM system polymer] the above. Composition of these copolymers can be performed according to the approach indicated by JP,47-25470,B, JP,48-85679,B, JP,51-21572,B, etc. If the thickness of a thin film layer is formed more thickly than the difference of elevation of the irregularity of a temporary base material which has irregularity, it will tend to reproduce a concavo-convex configuration. thickness is equal -- it is -- it is -- if thin, a concavo-convex configuration will deform. Moreover, the problem later mentioned when forming irregularity may occur.

[0023] As an under coat of this invention, the thing harder than a thin film layer of after concavo-convex formation is desirable. For example, polyolefines, such as polyethylene and polypropylene, ethylene and vinyl acetate, Ethylene, acrylic ester and ethylene, and an ethylene copolymer like vinyl alcohol, The copolymer of a polyvinyl chloride, a vinyl chloride, and vinyl acetate, the copolymer of a vinyl chloride and vinyl alcohol, A styrene copolymer like a polyvinylidene chloride, polystyrene, styrene, and acrylic ester (meta), A vinyltoluene copolymer like polyvinyl toluene, vinyltoluene, and acrylic ester (meta), At least one or more kinds of organic macromolecules chosen from the copolymer of Pori (meta) acrylic ester and acrylic ester like butyl acrylate (meta) and vinyl acetate (meta), synthetic rubber, a cellulose derivative, etc. can be used. In order to carry out concavo-convex formation postcure, the monomer which has a photoinitiator and an ethylene nature double bond if needed can be added beforehand. Moreover, although the sensitization type was shown by using negative-mold material, it is satisfactory even if it is a positive type.

[0024] As the method of application of the thin film layer of this invention, or an under coat, there are roll coater spreading, spin coater spreading, spray spreading, HOERA spreading, dip coater spreading, curtain flow coater spreading, wire bar coater spreading, gravure coater spreading, air knife coater spreading, etc. A thin film layer or an under coat constituent is applied to the temporary base material up etc. by the above-mentioned approach.

[0025] With a reflective mold LCD display, a metal with a high reflection factor, for example, aluminum metallurgy, silver, etc. are formed by the vacuum deposition method or the sputtering method

in 300nm to 800nm which is a light wavelength field that what is necessary is just to choose an ingredient appropriately by the wavelength field to reflect as reflective film. Moreover, the laminating of the reflective increment film (it indicates to the optical introduction 2 (Junpei in a crossing, Asakura Publishing, 1976 issuance)) may be carried out by the above-mentioned approach. The thickness of the reflective film has 0.01 micrometers - desirable 50 micrometers. Moreover, the reflective film may carry out pattern formation only of the required part with the photolithography method, mask vacuum deposition, etc.

[0026] It is thermally [as a covering film of the imprint film of this invention / chemically and] stable, and what has easy exfoliation with a thin film layer is desirable. It is specifically the thing of the shape of a thin sheet, such as polyethylene, polypropylene, polyethylene terephthalate, and polyvinyl alcohol, and what has surface high smooth nature is desirable. In order to give detachability, what carried out mold release processing to the front face is contained.

[0027] Moreover, the surface of separation after the imprint to the substrate of each imprint film becomes between the reflective film, a base film or the reflective film, and under coats, when there is reflective film between a thin film layer and a base film. However, by the case where it is the film structure which has an under coat and the reflective film depending on the object, since the laminating of the under coat is carried out to a substrate, between an under coat and base films can be set as the surface of separation. When giving the function as an electric insulation layer in the case of using the reflective film as an electrode to an under coat as an object which carries out the laminating of the under coat to a substrate, Or when using a photopolymer for an under coat when giving a role of a flattening layer of reflective film irregularity to an under coat, and giving a role of etching resist of the reflective film, an under coat may be colored further and a role of a partial protection-from-light layer of the reflective film may be given.

[0028] As an approach of imprinting the thin film layer on a temporary base material, and the reflective film to a substrate, a covering film may be removed and heating sticking by pressure may be carried out on a substrate. When you furthermore need adhesion, a required drug solution etc. may wash a substrate, or an adhesion grant agent may be applied to a substrate, or the approach of irradiating ultraviolet rays etc. may be used for a substrate. It is desirable to use the roll laminator which sends out a substrate, pinching a substrate between the rubber covered rolls and base films which can be heated and pressurized as equipment which laminates the imprint film of this invention, rotating a roll, and pressing an imprint film against a substrate. Thus, the thickness of the thin film layer formed in the substrate front face has the desirable range of 0.1 micrometers - 50 micrometers. At this time, the one where the thickness of a thin film layer is thicker than the maximum difference of elevation of a concavo-convex configuration tends to reproduce a concavo-convex configuration. thickness is equal -- it is -- it is -- if thin, a thin film layer will be broken through by pattern heights, the flat-surface section occurs, and it is hard coming to obtain diffuse reflection efficiently

[0029] When a negative-mold photopolymer is used for this thin film layer, in order to give the stability of that configuration, it exposes with an exposure machine, and a sensitization part is stiffened. As an exposure machine which can be applied to this invention, a carbon arc lamp, an ultrahigh pressure mercury lamp, a high-pressure mercury-vapor lamp, a xenon lamp, a metal halide lamp, a fluorescent lamp, a tungsten lamp, etc. are mentioned. What is necessary is just to give the quantity of light more than the light exposure which for that a photopolymer hardens in this invention that what is necessary is just to be able to do by stiffening the irregularity formed beforehand, although the parallel exposure machine for pattern formation, such as a pixel and BM, is sufficient as this aligner. Therefore, the UV irradiation equipment using the scattered light incorporable into the line generally used as a substrate washing station can be used. By using these equipments, the tolerance to light exposure is large compared with the case where can produce cheaply compared with the technique using a photo mask, and a photo mask is used. Moreover, although the sensitization type was shown by using negative-mold material, it is satisfactory even if it is a positive type. Exposure is performed, before removing a base material, or after removing. A cushion layer may be prepared in a base film in order to raise the adhesion to a substrate, and flattery nature.

[0030] Although the reflective mold LCD display explained above, the diffuse reflection plate manufactured with the imprint film of this invention can be used for a device with required carrying out diffuse reflection of the external beam of light. For example, there is a diffuse reflection plate aiming at the improvement in effectiveness of a solar battery. Moreover, the imprint film of this invention is applicable to manufacture of the white plate of a gobo, an ornament plate, an obscured glass, and a projection screen, a light filter, a condensing plate, a dimming plate, etc. Thus, the imprint film of this invention can be imprinted also to a glass plate, a synthetic-resin plate, a synthetic-resin film, a metal plate, and ***** or the becoming thing, and not only a flat surface but a curved surface and a solid side are sufficient as a transferred substrate side.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view showing an example of the imprint film of this invention.

[Drawing 2] The sectional view showing an example of the imprint film of this invention.

[Drawing 3] The sectional view showing an example of the diffuse reflection plate manufactured using the imprint film of this invention.

[Drawing 4] The sectional view showing an example of the diffuse reflection plate manufactured using the imprint film of this invention.

[Drawing 5] The sectional view of the reflective mold LCD.

[Drawing 3] The sectional view of the imprint film used for manufacture of the diffuse reflection plate of this invention.

[Drawing 4] The sectional view of the imprint film used for manufacture of the diffuse reflection plate of this invention.

[Drawing 5] The sectional view of the imprint film used for manufacture of the diffuse reflection plate of this invention.

[Drawing 6] The perspective view showing the measuring device of the reflection property of a diffuse reflection plate.

[Drawing 7] The sectional view showing an example of the diffuse reflection plate manufactured using the imprint film of this invention.

[Drawing 8] The graph which shows the relation between the transverse plane of the diffuse reflection plate shown in drawing 7, the include angle which the light source makes, the difference of the height of the concavo-convex section, and the pitch of heights.

[Drawing 9] The sectional view showing an example of the diffuse reflection plate manufactured using the imprint film of this invention.

[Drawing 10] The graph which shows the relation between the transverse plane of the diffuse reflection plate shown in drawing 9, the include angle which the light source makes, the difference of the height of the concavo-convex section, and the pitch of heights.

[Drawing 11] It is a ** Fig. about the incident angle dependency of the reflection property of the diffuse reflection plate of an example 1.

[Drawing 12] It is a ** Fig. about the incident angle dependency of the reflection property of the diffuse reflection plate of an example 3.

[Drawing 13] The sectional view showing an example of the imprint film of this invention.

[Drawing 14] The sectional view showing the production process of an example of the imprint film of this invention.

[Drawing 15] The sectional view showing the example of manufacture of activity ***** for the imprint film of this invention.

[Description of Notations]

1. Glass Substrate
2. Thin Film Layer

3. Reflective Film
4. Base Film
5. Covering Film
6. Under Coat
11. Light Filter
12. Black Matrix
13. Transparent Electrode
14. Flattening Film
15. Orientation Film
16. Liquid Crystal Layer
17. Spacer
18. Phase contrast film
19. Polarizing Plate
20. Sample
21. Reflected Ray
22. Incident Ray
23. Luminance Meter

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